

CLAIMS:

1. A method for altering a T cell mediated pathology in a patient, said method comprising:  
administering a composition comprising a chimeric protein;  
5 said chimeric protein comprising at least a portion of a  $V_{\beta}$  or  $V_{\alpha}$  region of a TCR, and at least a portion of an immunoglobulin constant region;  
wherein said  $V_{\beta}$  or  $V_{\alpha}$  region is associated with a particular TCR from a T cell from said patient having said T cell mediated pathology; and  
said administering of said composition alters said T cell mediated pathology in  
10 said patient.

2. The method of claim 1 wherein said composition further comprises a second chimeric protein comprising at least a portion of  $V_{\alpha}$  or  $V_{\beta}$  region of a TCR, and at least a portion of a second immunoglobulin constant region.

3. The method of claim 1 wherein said immunoglobulin constant region comprises a human  $IgG_{\gamma 1}$  constant region.

4. The method of claim 1 wherein said  $V_{\alpha}$  or  $V_{\beta}$  region of a TCR of said  
20 chimeric protein is a  $V_{\beta}$ .

5. The method of claim 1 wherein said  $V_{\alpha}$  or  $V_{\beta}$  region of a TCR of said chimeric protein is a  $V_{\alpha}$ .

6. The method of claim 1 wherein said chimeric protein further comprises a linker region between said  $V_{\alpha}$  or  $V_{\beta}$  region and said portion of an immunoglobulin constant region;

wherein said linker region is a portion of the  $C_\beta$  or  $C_\alpha$  region of a TCR, but not the entire  $C_\beta$  or  $C_\alpha$  region, or a synthetic linker region.

7. The method of claim 2 wherein said second chimeric protein further  
5 comprises a second linker region between said  $V_\alpha$  or  $V_\beta$  region and said portion of an immunoglobulin constant region;

wherein said linker region is a portion of the  $C_\beta$  or  $C_\alpha$  region of a TCR, but not the entire  $C_\beta$  or  $C_\alpha$  region, or a synthetic linker region.

- 10 8. The method of claim 1 or 2 wherein said  $V_\alpha$  or  $V_\beta$  region of a TCR of said first chimeric protein is a  $V_\beta$  and said  $V_\alpha$  or  $V_\beta$  region of a TCR of said second chimeric protein is a  $V_\alpha$ .

- 15 9. The method of claim 2 wherein said second immunoglobulin constant region comprises a human  $\kappa$  or  $\lambda$  constant region.

10. The method of claim 1 or 2 wherein said  $V_\beta$  region of a TCR is an entire  $V_\beta$  region.

- 20 11. The method of claim 1 or 2 wherein said  $V_\beta$  region comprises an entire  $V_\beta$  region and said portion of a  $C_\beta$  comprises the first nine amino acids from a TCR  $\beta$  chain constant region ( $C_\beta$ ).

12. The method of claim 1 or 2 wherein said  $V_\alpha$  region of a TCR is an entire  $V_\alpha$  region.

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13. The method of claim 6 or 7 wherein said  $V_{\alpha}$  region comprises an entire  $V_{\alpha}$  region and said linker region comprises the first nine amino acids from a TCR  $\alpha$  chain constant region ( $C_{\alpha}$ ).

5 14. The method of claim 1 or 2 wherein said first or second immunoglobulin constant region is selected from the group consisting of a human  $IgG_{\gamma 1}$  constant region, a human  $IgG_{\gamma 2}$  constant region, a human  $IgG_{\gamma 3}$  constant region, a human  $IgG_{\gamma 4}$  constant region, a human  $IgA_1$  constant region, a human  $IgA_2$  constant region, a human  $IgM$  constant region, a human  $IgD$  constant region, a human  $IgE$  constant region, a human  $\kappa$  chain constant region, and a human  $\lambda$  chain constant region.  
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15 15. The method of claim 1 wherein said chimeric protein is produced by a method comprising:

isolating genes encoding said  $V_{\beta}$  or  $V_{\alpha}$  regions of a TCR from T cells of said  
15 patient having said T cell mediated pathology;  
inserting said genes encoding said  $V_{\beta}$  or  $V_{\alpha}$  region of the TCR, a linker region, and the gene encoding said immunoglobulin constant region into an expression vector to allow the expression of said first chimeric protein;  
producing said chimeric proteins by introducing said expression vector into  
20 insect cell lines; and  
isolating said chimeric proteins.

16. The method of claim 15 further comprising the step of inserting a gene encoding either  $V_{\beta}$  or  $V_{\alpha}$  region of the TCR, a linker region, and a gene encoding at  
25 least a portion of a second immunoglobulin constant region into said expression vector to allow the expression of said second chimeric protein.

17. The method of claim 15 or 16 wherein said linker region of said first or second chimeric protein is a portion of the C<sub>β</sub> or C<sub>α</sub> region of a TCR, but not the entire C<sub>β</sub> or C<sub>α</sub> region, or a synthetic linker region.

5 18. The method of claim 15 or 16 further comprising a step of conjugating said chimeric proteins to a carrier protein.

10 19. The method of claim 18 wherein said carrier protein is keyhole-limpet hemocyanin (KLH).

20. The method of claim 1 wherein said composition is further co-administered with a cytokine or chemokine.

15 21. The method of claim 20 wherein said cytokine is granulocyte-macrophage-colony stimulating factor (GM-CSF).

22. The method of claim 20 wherein said chemokine is a monocyte chemotactic protein 3 (MCP 3).

20 23. The method of claim 15 wherein said expression vector is a baculovirus expression vector.

25 24. The method of claim 23 wherein said baculovirus expression vector comprises a honey bee melittin secretory signal sequence and a human placental alkaline phosphatase secretory signal sequence.

25. The method of claim 24 wherein said baculovirus expression vector further comprises a baculovirus AcNPV p10 promotor and AcNPV polyhedrin

promotor, said p10 promotor controls a honey bee melittin, and said polyhedrin promotor controls a human placental alkaline phosphatase.

26. The method of claim 25 wherein said genes encoding said  $V_{\beta}$  region of the TCR and said genes encoding said first immunoglobulin constant region are controlled by said p10 promotor in said baculovirus expression vector, said genes encoding said  $V_{\alpha}$  region of the TCR and said genes encoding said second first immunoglobulin constant region are controlled by polyhedrin promotor in said baculovirus expression vector.

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27. The method of claim 25 wherein said genes encoding said  $V_{\beta}$  or  $V_{\alpha}$  region of the TCR, and said genes encoding said immunoglobulin constant region are controlled by either said p10 promotor or polyhedrin promotor in said baculovirus expression vector.

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28. The method of claim 15 wherein said genes encoding said first immunoglobulin constant region comprises a human  $\text{IgG}_{\gamma 1}$  gene.

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29. The method of claim 16 wherein said second immunoglobulin constant region comprises a human  $\kappa$  or  $\lambda$  constant region gene.

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30. The method of claim 15 or 16 wherein said gene encoding said immunoglobulin constant region is selected from the group consisting of a human  $\text{IgG}_{\gamma 1}$  constant region, a human  $\text{IgG}_{\gamma 2}$  constant region, a human  $\text{IgG}_{\gamma 3}$  constant region, a human  $\text{IgG}_{\gamma 4}$  constant region, a human  $\text{IgA}_1$  constant region, a human  $\text{IgA}_2$  constant region, a human  $\text{IgM}$  constant region, a human  $\text{IgD}$  constant region, a human  $\text{IgE}$  constant region, a human  $\kappa$  constant region and a human  $\lambda$  constant region.

31. The method of claim 15 wherein said first chimeric protein is TCR V<sub>β</sub>-C<sub>β</sub>-IgG<sub>γ1</sub>, TCR V<sub>α</sub>-C<sub>α</sub>-κ or TCR V<sub>α</sub>-λ.

32. The method of claim 16 wherein said first and second chimeric proteins are TCR V<sub>β</sub>-C<sub>β</sub>-IgG<sub>γ1</sub> and TCR V<sub>α</sub>-C<sub>α</sub>-κ or TCR V<sub>β</sub>-C<sub>β</sub>-IgG<sub>γ1</sub> and TCR V<sub>α</sub>-C<sub>α</sub>-λ.

33. The method of claim 13 wherein said insect cell lines are *Trichoplusia ni* (Hi - 5) or *Spodoptera frugiperda* (sf9) cell lines.

34. The method of claim 15 or 16 wherein said chimeric proteins are analyzed for expression by ELISA.

35. The method of claim 15 or 16 wherein said chimeric proteins are isolated using a protein selected from the group consisting of protein A, protein G, protein L and other proteins being able to bind to an immunoglobulin binding domain.

36. The method of claim 35 wherein said other protein able to bind an immunoglobulin binding domain is an anti-immunoglobulin antibody.

37. The method of claim 1 wherein said T cell mediated pathology is T cell lymphoma.

38. The method of claim 1 wherein said T cell mediated pathology is an autoimmune disease selected from the group consisting of multiple sclerosis, systemic lupus erythematosus, diabetes, inflammatory bowel disease, myasthenia gravis, rheumatoid arthritis, and thyroiditis.

39. A composition for altering a T cell mediated pathology in a patient comprising:

a chimeric protein, said chimeric protein comprising at least a portion of a  $V_\beta$  or  $V_\alpha$  region of a TCR, and at least a portion of an immunoglobulin constant region,  
5 wherein said  $V_\beta$  or  $V_\alpha$  region is associated with a particular TCR from a T cell clone from said patient having said T cell mediated pathology.

40. The composition of claim 39 wherein said chimeric protein further comprises a linker region between said  $V_\alpha$  or  $V_\beta$  region and said portion of an  
10 immunoglobulin constant region;

wherein said linker region is a portion of the  $C_\beta$  or  $C_\alpha$  region of a TCR, but not the entire  $C_\beta$  or  $C_\alpha$  region, or a synthetic linker region.

41. A composition of claim 39 further comprising a second chimeric protein  
15 comprising at least a portion of a  $V_\beta$  and  $V_\alpha$  region of a TCR, and at least a portion of a second immunoglobulin constant region, wherein said  $V_\beta$  and  $V_\alpha$  region are associated with a particular TCR from a T cell clone from said patient having said T cell mediated pathology.

20 42. The composition of claim 40 wherein said chimeric protein further comprises a linker region between said  $V_\alpha$  or  $V_\beta$  region and said portion of an immunoglobulin constant region;

wherein said linker region is a portion of the  $C_\beta$  or  $C_\alpha$  region of a TCR, but not the entire  $C_\beta$  or  $C_\alpha$  region, or a synthetic linker region.

25 43. The composition of claim 39 or 40 wherein said chimeric proteins are produced in according to claim 13 or 14.

44. The composition of claim 39 or 40 wherein said immunoglobulin constant regions are selected from the group consisting of a human IgG<sub>γ1</sub> constant region, a human IgG<sub>γ2</sub> constant region, a human IgG<sub>γ3</sub> constant region, a human IgG<sub>γ4</sub> constant region, a human IgA<sub>1</sub> constant region, a human IgA<sub>2</sub> constant region, a human IgM constant region, a human IgD constant region, a human IgE constant region, a human κ chain constant region, and a human λ chain constant region.

45. The composition of claim 39 wherein said immunoglobulin constant region comprises IgG<sub>γ1</sub> constant region operatively linked to said V<sub>β</sub> region of the TCR.

46. The composition of claim 39 wherein said immunoglobulin constant region comprises κ or λ constant region operatively linked to said V<sub>α</sub> region of the TCR.

47. The composition claim 40 wherein said two chimeric proteins are V<sub>β</sub>-IgG<sub>γ1</sub> and V<sub>α</sub>-κ or V<sub>β</sub>-IgG<sub>γ1</sub> and V<sub>α</sub>-λ.

48. The composition of claim 39 or 40 further comprises a carrier protein.

49. The composition of claim 48 wherein said carrier protein is keyhole-limpet hemocyanin (KLH).

50. The composition of claim 39 or 40 is further co-administered with a cytokine or chemokine.

51. The composition of claim 50 wherein said cytokine is granulocyte-macrophage-CSF.



5            53.     The composition of claim 39 or 40 wherein said composition comprises  
an immunotherapy.

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